LYNCHBURG CITY COUNCIL
Agenda Item Summary

MEETING DATE: **March 26, 2002 Work Session** AGENDA ITEM NO.: 5

CONSENT: REGULAR: X CLOSED SESSION: (Confidential)

ACTION: X INFORMATION:

ITEM TITLE: **Sodium Hypochlorite Disinfection System Design – College Hill Water Plant**

RECOMMENDATION: Authorize the City Manager to execute a contract amendment for $84,045 with the engineering firm of Hazen and Sawyer for design of a new disinfection system at the College Hill Water Plant (CHWP). The City Attorney has reviewed the original contract and determined it is acceptable to execute an amendment for the design of the referenced project.

SUMMARY: In June 1999, the City of Lynchburg implemented a Risk Management Program (RMP) as mandated by the Environmental Protection Agency (EPA) and a Process Safety Management Program as mandated by the Occupational Safety and Health Administration (OSHA). This was in accordance to the Code of Federal Regulations (CFR) for facilities that use chemicals, which if released in an uncontrolled manner, may present a risk to public health and the environment. Chlorine is a chemical regulated by the RMP. Currently, the College Hill Filtration Plant uses liquid chlorine, which is delivered to the plant in one ton cylinders. The existing chlorine system is antiquated and difficult to properly maintain thereby increasing the potential of an uncontrolled release.

As a direct result of these programs, the firm of Hazen and Sawyer was contracted by the City to evaluate alternatives to reduce this risk. Hazen and Sawyer's recommended option was to remove the existing chlorine system and replace it with a much safer Sodium Hypochlorite system (Option #1). As an alternative to this option, a new vacuum chlorine system, including containment, scrubber system, and appurtenances could be installed (Option #2). Cost estimates and a summary of advantages and disadvantages of each option are attached. Additionally, photographs of existing and recommended facilities and an executive summary of the Hazen and Sawyer report are also attached.

After reviewing the advantages, disadvantages, and associated costs of each option, staff recommends proceeding with the design and construction of Option #1, the Sodium Hypochlorite system.

PRIOR ACTION(S): February 26, 2002 City Council Meeting: Initial presentation and discussion.

BUDGET IMPACT: Operating costs for the recommended process should be approximately equal to the existing system but will vary based on chemical costs. Funds are available in the current FY2002 Capital Budget, page 242, "Alternate Disinfection Process", for design and additional funds for construction are proposed in the FY2003 Capital Budget.

CONTACT(S): Bruce McNabb, Director of Public Works, 847-1823 (Ext. 268)
Stephen Bontrager, Director of Utilities, 847-l 322 (Ext. 107)
Timothy Mitchell, Utility Engineer, 847-l 322 (Ext. 112)

ATTACHMENTS: Resolution; Executive summary from Hazen and Sawyer report; Cost Estimates and Advantages and Disadvantages of each option; Photographs of proposed and existing systems.

REVIEWED BY:

Resolution:

BE IT RESOLVED That the City Manager, L. Kimball Payne, III, is authorized to execute a contract amendment in the amount of $84,045 with the firm of Hazen and Sawyer, to design a new disinfection system located at the College Hill Water Plant.

Adopted:

Certified: _____

Clerk of Council

EXECUTIVE SUMMARY

The City of Lynchburg's College Hill Water Treatment Plant (WTP) is a conventional treatment plant rated at 14 mgd at a filtration rate of 4 gpm/sq. ft., with an existing average daily flow (ADF) of approximately 6 mgd. The plant utilizes chlorine gas as a disinfectant. Following completion of a Risk Management Plan, the City decided to investigate alternative forms of chlorine. This study evaluated alternative methods for changing to sodium hypochlorite solution, including (1) a storage and feed system for commercially produced sodium hypochlorite solution, and (2) an on-site sodium hypochlorite generation system.

In a liquid sodium hypochlorite bulk storage and feed system, commercially produced sodium hypochlorite solution would be delivered in 4,500-gallon truckloads as a 12.5 - 15% available chlorine solution, then diluted with finished water to 5% in two 12,000-gallon storage tanks. Metering pumps would draw solution from a 1,200-gallon day tank and pump it to the raw and finished water application points. With a new building housing the system plus one additional future storage tank, this system would provide 30 days of storage at the current peak flow of 9 mgd and an average dose of 4.2 mg/L. It would also provide room to expand to 30 days of storage at the plant design capacity of 14 mgd and the average chlorine dose.

Using on-site generation, a dilute (0.8%) solution of sodium hypochlorite would be produced by dissolving salt (sodium chloride) in water, and electrolyzing this brine solution in three 300 lb./day generation units. Two 7,500-gallon storage tanks would provide 2 days of sodium hypochlorite storage at the design capacity (14 mgd) and average dose (4.2 mg/L). Metering pumps would deliver solution to the raw and finished water application points. A new building would also be required for this system. Space would be provided for approximately 30 days of salt storage in the brine dissolvers.

The total present worth cost of the bulk liquid sodium hypochlorite system was estimated at $1,661,000, while the cost of the on-site generation system was estimated at $2,693,000. Based on cost, reliability, and, ease of operation and maintenance, a bulk liquid sodium hypochlorite feed facility is recommended for the College Hill WTP. Table 4-1 of this report shows a cost breakdown and Figure 3-1 shows a layout of the recommended facilities.

The feasibility of future ozone or UV treatment was also considered. Future use of one of these technologies to supplement chlorine may become necessary in order to comply with future microbial inactivation requirements of the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). It is uncertain at this time if the future regulations will require higher levels of treatment for Lynchburg. Should higher disinfection levels be required, UV disinfection would be easier to implement and would be the less costly option.

Cost Estimates and Advantages and Disadvantages of Each Option

Option 1 (Sodium Hypochlorite) - Cost Estimate:

♦ Engineering		$84,000
♦ Construction		644,000
	Subtotal	$728,000
	Contingency (10%)	72,000
	Total Capital Cost	$800,000

Option 2 (Upgrade Existing System) - Cost Estimate:

♦ Engineering		$50,000
♦ Construction		510,000
	Subtotal	$560,000
	Contingency (15%)	84,000
	Total Capital Cost	$644,000

Advantages and Disadvantages

Option #1 (Sodium Hypochlorite) – Advantages:

- Eliminates the hazards of transporting liquid chlorine in an urban environment.
- Eliminates the potential hazards to the public, employees, and the environment due to an accidental release.
- Eliminates chlorine as a potential terrorist target.
- Operating costs are comparable to the existing system.
- Eliminates the need for a RMP and PSMP and associated costs and liability at the College Hill Filtration Plant.
- Overall much safer.

Option #1 (Sodium Hypochlorite) - Disadvantages:

- Slightly higher capital costs.

Option #2 (Upgrade Existing System) – Advantages:

- Slightly lower capital costs.

Option #2 (Upgrade Existing System) – Disadvantages:

- Hazards of transporting liquid chlorine in an urban environment still exist.
- The RMP and PSMP must still be maintained at an approximate cost of $5,000 per year.
- Additional operating costs of approximately $2,500 per year above existing chlorine system.

Existing Chlorine Facilities- College Hill WTP

Similar Construction
Liquid Sodium Hypochlorite Process